



6130

# 6130/3C45 HYDROGEN THYRATRON

POSITIVE-CONTROL TRIODE TYPE

**GENERAL DATA****Electrical:**

Heater, for Unipotential Cathode:

Voltage. . . . . 6.3 {  $+5\%$  . . . ac or dc volts  
 $-10\%$

Current at 6.3 volts:

Minimum. . . . . 2 amp  
 Average. . . . . 2.3 amp  
 Maximum. . . . . 2.5 amp  
 Minimum heating time. . . . . 2 minutes

Direct Interelectrode Capacitances

(Approx.):

Grid to anode. . . . . 3.9  $\mu\text{f}$   
 Grid to cathode. . . . . 8.6  $\mu\text{f}$

Ionization Time (Approx.)  $\square$  . . . . . 0.6  $\mu\text{sec}$

Deionization Time (Approx.) . . . . . 25  $\mu\text{sec}$

Anode-Cathode Voltage Drop (Approx.)

at middle of pulse duration. . . . . 150 volts

Maximum Variation in Firing Time (Jitter). . . . . 0.06  $\mu\text{sec}$

**Mechanical:**

Operating Position. . . . . Any

Maximum Overall Length. . . . . 5-3/16"

Seated Length. . . . . 4-3/8"  $\pm$  3/16"

Maximum Diameter. . . . . 1-9/16"

Weight (Approx.) . . . . . 3 oz

Cooling. . . . . Natural

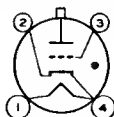
Bulb. . . . . T12

Cap. . . . . Small (JEDEC No. C1-1)

Base . . . . Medium-Shell Small 4-Pin, Micanol (JEDEC No. A4-9)

Basing Designation for BOTTOM VIEW. . . . . 4BL

Pin 1—Heater  
 Pin 2—Cathode,  
 Circuit  
 Returns



Pin 3—Grid  
 Pin 4—Heater,  
 Cathode  
 Cap—Anode

**PULSE-MODULATOR SERVICE****Maximum and Minimum CCS<sup>®</sup> Ratings, Absolute Values:**

For pressures down  
 to 70 mm of Hg<sup>#</sup>

DC ANODE-SUPPLY VOLTAGE. . . . . 800 min. volts

PEAK ANODE VOLTAGE:

Forward ( $E_{bm\text{f}}$ )<sup>\*</sup>. . . . . 3000 max. volts

Inverse. . . . . 5% of  $E_{bm\text{f}}$  min. volts

After anode-current pulse:<sup>▲</sup>

During first 25  $\mu\text{sec}$ . . . . . 1500 max. volts

After first 25  $\mu\text{sec}$ . . . . . 3000 max. volts

 $\square$ ,  $\bullet$ ,  $\#$ ,  $\ast$ ,  $\blacktriangle$ : See next page.



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For pressures down  
to 70 mm of Hg<sup>\*</sup>

## GRID VOLTAGE:

Negative (DC or Peak), before conduction. . . . .	200 max.	volts
Peak positive-pulse. . . . .	175 min.	volts

## ANODE CURRENT:

Peak . . . . .	35 max.	amp
Average <sup>o</sup> . . . . .	0.045 max.	amp
Rate of rise . . . . .	750 max.	amp/ $\mu$ sec
OPERATION FACTOR†. . . . .	$3 \times 10^8$ max.	
PULSE DURATION*. . . . .	6 max.	$\mu$ sec
AMBIENT-TEMPERATURE RANGE. . . .	-50 to +90	°C

Typical Operation:<sup>‡</sup>

At 2000 pps in accompanying circuit  
with pulse duration of 0.5  $\mu$ sec

DC Anode-Supply Voltage. . . . .	1250	volts
Peak Anode Voltage:		
Forward. . . . .	3000	volts
Inverse:		
Immediately after anode- current pulse. . . . .	530	volts
GRID VOLTAGE:		
Negative, before conduction. . . .	0	volts
Peak positive-pulse (Unloaded) . .	175	volts
Effective Grid-Circuit Resistance. .	1000	ohms
ANODE CURRENT:		
Peak . . . . .	35	amp
Average <sup>o</sup> . . . . .	0.035	amp
Operation Factor†. . . . .	$2.1 \times 10^8$	
Peak Power Output to Pulse		
Transformer (T). . . . .	43000	watts

## Maximum Circuit Values:

Effective Grid-Circuit Resistance. .	1500 max.	ohms
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□ Defined as the time interval between the point on the rising portion of the grid pulse which is 26 per cent of the peak unloaded-pulse amplitude and the point on the anode-current pulse which is 26 per cent of its peak amplitude. The anode-current pulse has a maximum time rise of 0.05  $\mu$ sec. The grid pulse has a minimum peak amplitude of 130 volts, a maximum rise time of 0.5  $\mu$ sec, and is supplied by a driver having a maximum internal impedance of 1500 ohms.

● Continuous Commercial Service.

\* Corresponds to altitude of about 50,000 feet.

\* In applications where the anode voltage is applied instantaneously, the power-supply filter should be designed so that the peak forward anode voltage is applied at a rate not to exceed 75,000 volts per second.

▲ Exclusive of spike not having more than 0.05  $\mu$ sec duration.

○ Averaged over any cycle.

† Defined as  $\text{Peak Forward Anode Volts} \times \text{Pulse-Repetition Rate (pps)} \times \text{Peak Anode Amperes (excluding spike)}$ .

⊕, ↓: See next page.



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- Pulse duration is defined as the time interval between points on the pulse envelope at which instantaneous amplitudes are equal to 70.7 per cent of the maximum amplitude excluding spike.
- Operation with a bulb temperature within the approximate range of 60° to 90° C measured on the bulb directly opposite the anode is recommended for longest life. To attain this temperature under operating conditions involving low ambient temperature, the use of a heat-conserving enclosure for the tube may be necessary.

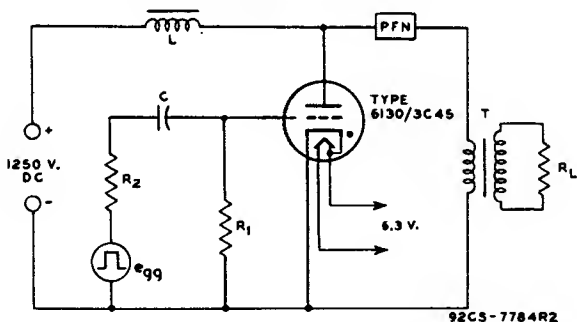
## OPERATING CONSIDERATIONS

The *anode* is brought out of the tube to a Small cap. The connector for this cap should be of the heat-radiating type and the connector lead should have ample current-carrying capability for the operating requirements.

*Shielding* of the 6130/3C45 should be provided if it is operated in the presence of strong electric fields which will ionize the gas within the tube. Any such ionization will cause erratic performance.

*Cooling* of the 6130/3C45 is accomplished by natural circulation of air around it. Under no circumstances should a stream of cooling air be applied to the glass envelope.

## TYPICAL PULSE-MODULATOR CIRCUIT



C: Blocking Capacitor, 0.001  $\mu$ f

egg: Pulse Generator supplying peak positive-pulse grid voltage of 175 volts (unloaded)

L: Charging Choke, 5 henries

PFN: Pulse-Forming Network with iterative impedance of 50 ohms, and a two-way transmission time of 0.5  $\mu$ sec

R<sub>1</sub>: Grid Resistor, 30,000 ohms

R<sub>2</sub>: Effective Resistance of grid circuit, 1000 ohms

R<sub>L</sub>: Load Resistance. Value reflected into primary of transformer (T) is 35 ohms.

T: Matching Pulse Transformer

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## HYDROGEN THYRATRON

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